

**PATENT**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

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**Title:** Single-Base Propellant Composition Using BuNENA As Energetic Plasticizer

**Appellant(s):** Thelma G. Manning et al.

**Attorney Docket No.:** 2000-021

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**Application No.:** 10/711,651

**Examiner:** Aileen Baker Felton

**Filed:** 09/29/2004

**Art Unit:** 1793

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Board of Patent Appeals and Interferences  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450.

**APPEAL BRIEF**

Dear Sir or Madam:

This appeal brief is submitted in response to the Final Action issued January 5, 2010, and in full compliance with 37 CFR §§ 41.31 and 41.37, including being filed with the requisite 3 month petition and fee to extend the shortened statutory period set for reply to the Final Action – which extended period does not end until July 6, 2010 (considering the Federal Holiday on July 5<sup>th</sup>). A Notice of Appeal and the requisite fee specified under §41.20(b)(1) are also submitted herewith.

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### **(1) Real Party in Interest**

Per appellants' and the USPTO Assignment records, and to the best of appellants knowledge and understanding, the only assignee of any right, title and interest regarding the subject patent application is the United States Army, an agency of the United States Government.

### **(2) Related Appeals and Interferences**

There are no other prior or pending appeals or interferences or judicial proceedings known to the appellant, the appellant's legal representative, or assignee which may be related to, directly affecting, or be directly

affected by, or have a bearing on the Board's decision in the subject appeal.

**(3) Status of Claims**

Statement of all Claim(s) in the Proceedings:

Claims 1-5 Cancelled

Claim 6 Rejected

Pursuant to the January 5, 2010, Final Rejection only independent Claim 6 remains pending and rejected in the subject application.

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Identification of Claims being Appealed

Claim 6, the sole remaining claim in the subject application, stands rejected under 35 USC §103(a), and the 35 USC §112, first paragraph, both of which rejections are both being appealed hereby.

**(4) Status of Amendments**

No amendments have been filed subsequent to final rejection, none are outstanding.

## **(5) Summary of Claimed Subject Matter**

### **5.1. Summary of the subject matter of independent claims**

There is one claim remaining, Claim 6, which reads:

6. A gun propellant formulation consisting of:
- an alcohol-wet nitrocellulose component consisting of about 65% to about 95% of the propellant by weight, said nitrocellulose component having a Nitrogen proportion of substantially 12.6% Nitrogen, where said nitrocellulose component is a combination of a first nitrocellulose composition having a nitrogen proportion of 13.4% Nitrogen and a second nitrocellulose composition having a Nitrogen proportion of 11.3% Nitrogen, such that the combination has a Nitrogen proportion of 12.6% Nitrogen;
  - an energetic plasticizer component consisting of about 5% of the propellant by weight, said energetic plasticizer component consisting of N-Butyl-2-Nitratoethyl Nitramine (BuNena);
  - a burning rate moderator and stabilizer component consisting of about 0.5% to about 5% of the propellant by weight, wherein the burning rate moderator and stabilizer component is Ethyl Centralite;
  - a stabilizer consisting of about 0.5% to about 5% of the propellant by weight, said stabilizer consisting of Acetyl triethyl citrate (ATEC);
  - whereby, said formulation provides an insensitive gun propellant.

Each of the elements in the above claim, Claim 6, is supported in the specification as follows:

- (i) In the preamble to the claim, that the subject propellant is a gun propellant formulation – disclosed in Para 10, line 1 of the original Specification;
- (ii) In Para. 29 ... "a quantity of alcohol-wet nitrocellulose having a Nitrogen content of twelve and six-tenths percent (12.6%)";
- (iii) In Para. 12 "... a nitrocellulose component comprising from about sixty-five percent (65.0%) to about ninety-five (95.0%) of the gun propellant by weight, having a nitrogen proportion of substantially twelve and six-tenths percent (12.6%) nitrogen";
- (iv) In Original Claim 2, as filed, "... nitrocellulose component comprising about 65.0% to about 95% of the gun propellant by weight is a combination of a first nitrocellulose composition having a Nitrogen proportion of about 13.4% Nitrogen and a second nitrocellulose composition having a Nitrogen proportion of about 11.3% Nitrogen, such that the combination has an average Nitrogen proportion of about 12.6% Nitrogen.
- (v) In Para. 13 "... an energetic plasticizer component comprising from about 5.0 percent (5.0%) to about 35 percent (35%) of the gun propellant by weight, said energetic plasticizer component comprising N-Butyl-2-Nitratoethyl Nitramine (BuNENA)";
- (vi) In Para. 14 "... a burning rate modifier and stabilizer component comprising from about one-half of one percent (0.5%) to about five percent (5.0%) of the gun propellant by weight ... Ethyl Centralite";
- (vii) In Para. 15 "... a stabilizer component comprising about one-half of one percent (0.5%) to about five percent (5.0%) of the gun propellant by weight ... Acetyl triethyl citrate (ATEC)";

- (viii) In Para. 18 "... [o] r novel gun propellant ... an "insensitive" munitions."

**(6) Grounds of Rejection to be Reviewed on Appeal**

**Independent Claim 6 – stands "Rejected" under 35 USC §§ 112 and 103(a)**

**35 USC §112**

Claim 6 stands rejected under 35 USC §112, first paragraph, as failing to comply with the written description requirement by containing subject matter not described in the specification in such a way as to reasonably convey to one skilled in the art that the appellant had possession of the claimed invention at the time of filing. More specifically, Claim 6 requires "about 5%" for the plasticizer component – the Examiner stating that as the specification only discloses a range (i.e. Para. 13 – "a energetic plasticizer component comprising from about 5.0 (5.0%) to about 35 percent (35%) of the gun propellant by weight, said energetic plasticizer component comprising N-Butyl-2-Nitratoethyl Nitramine (BuNENA)") – that there is no basis for the selected particular "about 5%" number from this range.

**35 USC §103(a)**

Claim 6 also stands rejected under 35 USC §103(a) as being unpatentable over Hamilton et al. (U.S. Pat. 5,602,361), in view of Mulla et al. (U.S. Pat.

5,507,893, and Manning et al. (U.S. Pat. 6,607,618. Where the Examiner has held that:

- (1) Hamilton discloses known gun propellants that comprise 76.6% of 13.25% nitrocellulose, 20% of plasticizer such as nitroglycerin, 0.6% of ethyl centralite, and 0.4% graphite and that Hamilton also discloses the use of acetyl triethyl citrate with other gun propellants.
- (2) Mullay teaches 5-10% of BuNENA as an energetic plasticizer that is a substitute for nitroglycerin in a gun propellant; and
- (3) Manning teaches that it is known to use 12.6% nitrocellulose and also mixtures of nitrocellulose of 12.6% and 13.35% -- we well as disclosing use of additives such as graphite, potassium sulfate and Candelilla wax with gun propellants.

The Examiner concluding: that, (i) it would be obvious to use acetyl triethyl citrate with the first gun propellant as taught by Hamilton, since Hamilton suggests that is useful in other gun propellants; (ii) it is obvious to use BuNENA since Mullay suggests that it is a replacement for nitroglycerin which is the plasticizer used in Hamilton; (iii) it is also obvious, to used a varied amount of nitrogen content in nitrocellulose, amounts of ingredients, and to use mixtures of the different amounts since Manning suggests that it is useful in gun propellants and also to use the various additives of suggested by Manning; and (iv) it would have been obvious to vary the parameters of the propellant (such as the amount of acetyl triethyl citrate) to achieve a desired result. The Examiner concluding that it is well settled that optimizing a result effective variable is well within the expected ability of a person of ordinary skill in the art. (references cited by Examiner omitted).

## **(7) Arguments**

### **7.1 35 USC §112 Rejection of Sole Remaining Claim 6**

Claim 6 stands rejected under 35 USC §112, as failing to comply with the written description requirement. The Examiner stated that there was no disclosure in the originally filed application that supports "about 5%" of an energetic plasticizer component (i.e. BuNENA).

#### **Point of Contention**

Applicants respectfully submit that the presently claimed quantity of about 5% BuNENA by weight is fully supported by Para 13 of the specification; by initial, now canceled, Claim 1; and by the Abstract as originally submitted -- all of which state: "an energetic plasticizer component comprising from about 5.0 percent (5.0%) to about 35 percent (35%) of the gun propellant weight, and comprising N-Butyl-2Nitratooethyl Nitramine (BuNENA)".

#### **Legal Basis of Argument**

The patent law is clear that "[t]he burden of showing that the claimed invention is not described in the application rests on the PTO in the first instance, and it is up to the PTO to give reasons why a description not in *ipsis verbis* is insufficient." *Application of Edwards*, 196 USPQ 465, 469 (CCPA 1978). Also, see *Ex Parte Harvey*, 3 USPQ2d 1626, 1986 (Bd. Pat. App. & Interferences 1986). Further, "[l]ack of literal support ... is not enough ... to support a rejection under §112 ... [t]he test is whether the disclosure of the application relied upon reasonably conveys to a person skilled in the art that the inventor had possession of the claimed subject



matter ..." *Ralston Purina Co. v. Far-Mar-Co, Inc.*, 227 USPQ 177, 179 (Fed. Cir. 1985), as quoted by, *Herbert L. Eiselstein v. Richard B. Frank*, 34 USPQ2d 1467 (Fed. Cir. 1995).

### Argument

#1. Respectfully, the Patent Examiner failed to satisfy his burden of providing a reason(s) as to why "an energetic plasticizer component comprising from about 5.0 percent (5.0%) to about 35 percent (35%) of the gun propellant weight," fails the written description requirement of 35 USC §112, other than the absence of the exact language in the specification – as required by the above cited case law (and MPEP §7.06.03(c), Examiner Note to §7.31.01 "and provide an explanation of your position"). The Examiner merely stated that "only ranges have been disclosed and there is no basis for selecting a particular number from this range" – which is certainly not an explanation as to why one of ordinary skill would not understand why applicants did not possess and fully disclose the claimed invention containing about 5% of an energetic plasticizer component.

#2. Respectfully, Applicants' limitation of the subject claim to "about 5%", i.e. an end point of the initially described and claimed about 5 to about 35% range, cannot be said to be new matter. One of ordinary skill in the art, in fact anyone whose taken Chemistry 101, knows that each and every part of the about 5% to about 35% range is included therein, including 5% - and each and every part of the subject 5% to 35% is as functional, within applicants' claimed formulation, as any other portion (i.e. such as the claimed, about 5%).

### Conclusion of the Above Argument

Considering the law and logic embodied in the above argument:

(1) It is respectfully submitted that (1) the Examiner failed to meet her burden to articulate any reason, other than lack of *ipsis verbis* disclosure for the subject rejection and therefore it is an improper rejection and must be withdrawn;

(2) There is no new matter and there is adequate disclosure within Applicants' initial patent application, including the claims, such that a person skilled in the art would recognize that Applicants did initially disclose a quantity of energetic plasticizer, BuNENA, of 5%, as their invention – such that the subject claim 6 is in full compliance with 35 USC §112.

.....

### **7.2 35 USC §103 Rejection of Sole Remaining Claim 6**

Claim 6 stands rejected under 35 USC §103(a), as unpatentable over Hamilton et al. (U.S. Pat. 5,602,361), in view of Mullay et al. (U.S. Pat. 5,507,893, and Manning et al. (U.S. Pat. 6,607,618

### Point of Contention – regarding Applicants' base formulation in Claim 13 and hence all rejected claims

The Patent Examiner stated that (1) Hamilton discloses known gun propellants that comprise 76.6% of 13.25% nitrocellulose, 20% of plasticizer such as nitroglycerin, 0.6% of ethyl centralite, and 0.4% graphite and that Hamilton also discloses the use of acetyl triethyl citrate with other gun propellants.

(2) Mullay teaches 5-10% of BuNENA as an energetic plasticizer that is a substitute for nitroglycerin in a gun propellant; and

(3) Manning teaches that it is known to use 12.6% nitrocellulose and also mixtures of nitrocellulose of 12.6% and 13.35% – we well as disclosing use of additives such as graphite, potassium sulfate and Candelilla wax with gun propellants.

· Applicants' contends that the Hamilton reference is not a valid obviousness reference as (i) Hamilton does not disclose and, in fact the Examiner never cites any disclosure or reference to "an alcohol-wet nitrocellulose" as claimed; (ii) Hamilton is nonanalogous art vs. the field of applicants' claimed invention; (iii) Hamilton contains a nitroglycerine based formula – which to anyone of ordinary skill is anathema to any insensitive munition (as claimed by applicants); (iv) Hamilton discloses use of 20% nitroglycerine by weight as the plasticizer and use of such a quantity of applicants claimed BuNENA plasticizer would be nonfunctional; and finally, (v) there is no teaching or suggestion in Hamilton or elsewhere (other than hindsight) that reducing Hamilton's 20% level of nitroglycerine plasticizer by three-quarters (75%) with about 5% BuNENA would be functional – certainly a surprising result. And, without Hamilton as a reference, there is no basis to consider the subject patent application obvious - as there are no other references or teachings that disclose applicants claimed insensitive gun propellant with an alcohol wet nitrocellulose component of about 65 to about 95% of the propellant, having a Nitrogen proportion of substantially 12.6% Nitrogen; about 5% of BuNENA, an energetic plasticizer, about 0.5 to 5% of Ethyl Centralite, a burn rate moderator; about 0.5 to 5% of ATEC, a stabilizer; etc.

### Legal Basis of Arguments

With respect to the five (5) points of contention detailed above and argued below:

- (i) Obviousness requires a suggestion of **all** limitations in a claim. *CFMT, Inc. v. Yieldup Intern. Corp.*, 349 F.3d 1333, 68 U.S.P.Q.2d 1940, 1947 (Fed. Cir. 2003); e.g. the prior art must contain a teaching to modify the prior art food warmer to include all the features of the claimed invention. *Stein Industries, Inc. v. Jarco Industries, Inc.*, 934 F.Supp. 55, 40 U.S.P.Q.2d 1955 (E.D. N.Y. 1996) [emphasis added for clarity];
- (ii) A reference is not available under 35 USC §103 if it is not within the field of the inventor's endeavor and was not directly pertinent to the particular problem with which the inventor was involved. *King Instrument Corp., v. Otari Corp.*, 767 F.2d 853, 226 U.S.P.Q. 402 (Fed. Cir. 1985). Further, it has been held that: “[a] reference is reasonably pertinent if ... it is one which, because of the matter with which it deals, logically would have commended itself to an inventor’s attention in considering his problem. Thus, the purposes of both the invention and the prior art are important in determining whether the reference is reasonably pertinent to the problem the invention attempts to solve.” *State Contracting & Engineering Corp. v. Condotte America, Inc.*, 346 F.3d 1057, 68 U.S.P.Q.2d 1481, 1490 (Fed. Cir. 2003).
- (iii) The consistent criterion for determination of obviousness is whether the prior art would have suggested to one of ordinary skill in the art that a claimed invention should be carried out and would

have a reasonable likelihood of success, viewed in the light of the prior art. Both the suggestion and the expectation of success must be found in the prior art, not in the applicant's disclosure. *Regents of University of California v. Synbiotics Corp.*, 29 U.S.P.Q.2d 1463, 1466 (S.D. Cal. 1993)

- (iv) A proper analysis under §103 requires, inter alia, consideration of two factors: (1) whether the prior art would have suggested to those of ordinary skill in the art that they should make the claimed composition or device, or carry out the claimed process; and (2) whether the prior art would also have revealed that, in so making and carrying out, those of ordinary skill would have a reasonable expectation of success. *Noelle v. Lederman*, 355 F.3d 1343, 69 U.S.P.Q.2d 1508, 1515 (Fed. Cir. 2004).
- (v) Any useful and unexpected property should be eligible to overcome a prima facie obvious determination. *Pfizer, Inc. v. Apotex, Inc.*, 488 F.3d 1377, 82 U.S.P.Q.2d 1852, 1856 (Fed. Cir. 2007).

### Argument

Respectfully, with respect to each of the above cited Points of Contention and respective Legal citations:

- (i) the Examiner never noted, discussed, provided citations, or in any way considered the limitation that the nitrocellulose component claimed by applicants is "an alcohol wet" such compound – as clearly held in the *CFMT and Stein Industries* cases – if each limitation in the claim is not found obvious, there cannot be a holding of obviousness with respect to the subject claim in its entirety;

- (ii) no one of ordinary skill in the art would logically look to or consider the Hamilton reference that is entirely outside of the present inventions field, relating to a Hybrid Inflator , i.e. an inflator for auto air/safety bags – which has buried therein disclosure about “gun type propellants.” As the Hamilton reference is outside the field of the inventor's endeavor, munitions in general, and was not directly pertinent to the particular insensitive munitions problem with which the inventor was involved, i.e. providing insensitive munitions – pursuant to the Federal Circuit holdings cited above, Hamilton is not a proper Obviousness reference and should not be allowed as such;
- (iii) no one of ordinary skill in the art would logically look to or consider the nitroglycerine based propellant disclosure in the Hamilton reference as viable for an insensitive gun propellant as claimed by applicants. As detailed in the attached Affidavit of May 4, 2009 by Thelma Manning (of record in the May 5<sup>th</sup>, 2009 Amendment) – Item 3(b) therein: nitroglycerine, the plasticizer used in the Hamilton disclosure, is very sensitive, very high energy – and “in selecting a plasticizer a gun scientist would not consider ... any application that nitroglycerine would be considered for, nor would a scientist replace BuNENA with nitroglycerine – they are opposite in application with respect to gun propellants.” Therefore, one of ordinary skill in the art would not have considered the Hamilton reference as providing any reasonable likelihood of success – without the applicants' disclosure – and therefore, again, Hamilton is not a valid obviousness reference;
- (iv) no one of ordinary skill in the art would logically consider replacing 20% of the nitroglycerine plasticizer disclosed in Hamilton with a like

quantity of BuNENA for any likelihood of success (Hamilton only teaching use of a nitroglycerine plasticizer at the 20% level) – as it is known that using over 10% BuNENA overplasticizes a gun propellant with applicants' claimed nitrocellulose based binder/explosive system causing bubbles and further resulting in a brittle formulation, especially under cold temperatures under which gun propellants are required to perform. (See, attached May 4, 2009 Affidavit of Thelma Manning – of record in the May 5, 2009 Amendment filed in the subject case).

- (v) there is no basis or teaching cited by the Examiner, where one of ordinary skill in the art would replace 20% of a nitroglycerine plasticizer in the formulation disclosed in Hamilton, with only 5% of BuNENA (75% less), and have any inkling (other than hindsight) that the resulting formulation would be functional. Further the teachings of Mullay and Manning, don't disclose anything about the replacement in a 20% nitroglycerine plasticized formulation with any quantity of BuNENA – let alone such a vast (75%) reduction. Such a reduction of plasticizer is certainly a useful and unexpected benefit and therefore overcomes the Examiner's obvious determination – per the above cited art.

#### Conclusion of the Above Argument

Based upon the above arguments, it is respectfully submitted that the Examiner has not provided a complete case of obviousness with respect to all of the limitations of applicants' claimed invention – and therefore the subject rejection cannot stand. Further, for the reasons detailed above, the citation of the Hamilton reference is not valid and without that reference the subject obviousness rejection cannot stand. And, finally,

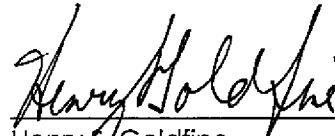
there are no references cited that in any way imply or suggest any possibility of success with the use of a quantity of only 5% BuNENA plasticizer – a surprising and unexpectedly low quantity to replace 20% nitroglycerine plasticizer– a result that overcomes any obviousness holding.

### **CONCLUSION**

Considering the above, the sole remaining claim is not obvious over the cited prior art – and its patentability such be sustained.

Respectfully submitted,

Date: July 6, 2010



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**APPENDIX A**  
**CLAIMS APPENDIX**

**Listing of Claims – Involved in the Appeal**

Claim 6. A gun propellant formulation consisting of:

an alcohol-wet nitrocellulose component consisting of about 65% to about 95% of the propellant by weight, said nitrocellulose component having a Nitrogen proportion of substantially 12.6% Nitrogen, where said nitrocellulose component is a combination of a first nitrocellulose composition having a nitrogen proportion of 13.4% Nitrogen and a second nitrocellulose composition having a Nitrogen proportion of 11.3% Nitrogen, such that the combination has a Nitrogen proportion of 12.6% Nitrogen;

an energetic plasticizer component consisting of about 5% of the propellant by weight, said energetic plasticizer component consisting of N-Butyl-2-Nitratoethyl Nitramine (BuNena);

a burning rate moderator and stabilizer component consisting of about 0.5% to about 5% of the propellant by weight, wherein the burning rate moderator and stabilizer component is Ethyl Centralite;

a stabilizer consisting of about 0.5% to about 5% of the propellant by weight, said stabilizer consisting of Acetyl triethyl citrate (ATEC);

whereby, said formulation provides an insensitive gun propellant.

**APPENDIX B**  
**EVIDENCE**

Attached is a copy of a 37 CFR §1.132 Affidavit, dated May 4, 2009, and submitted with and in support of a May 5, 2009 Amendment in the prosecution of the subject patent application – I.e. of record. Applicants' hereby submit this Affidavit as Evidence of patentability, as argued in this Appeal Brief.

**APPENDIX C**  
**RELATED PROCEEDINGS**

**None**

## In the United States Patent & Trademark Office

Application No. 10/711,651

Applicant: Thelma G. Manning, et al. :

Customer No. 32170 : Art Unit: 1793

Filed: 09/29/2004 : Examiner: Aileen Baker Felton

Customer Docket: 2000-021

Titled: Single-Base Propellant Composition Using BuNENA As Energetic Plasticizer

### **AFFIDAVIT PURSUANT TO 37 CFR 1.132**

State of New Jersey :  
: ss.  
County of Morris :

I, Thelma G. Manning, a resident of the township of Montville, in the county of Morris, State of New Jersey, in the United States of America, being duly sworn, depose and say that:

- 1.0 I am a named inventor with respect to the above cited patent application.
- 2.0 I am a chemical engineer, having graduated from the Manila University of Santo Thomas Catholic University in the Philippines, and MS in Chemical Engineering from N.Y Polytechnic University and am currently a Ph.D. candidate in Chemical Engineering at NJ Institute of Technology, degree expected in the fall of 2009.
- 3.0 I am now and have been since 1989, an employee of the U.S. Army, Research, Development, and Engineering Command (ARDEC), working in the Energetic Warheads Directorate, the Propulsion Technology and Direct Fire Branch, which is located at the Picatinny Arsenal, in Dover, New Jersey.
- 2.0 At ARDEC, my title is Chemical Engineer, where I have 20 years of experience in the engineering and development of energetic materials and prior to that I worked as a nuclear power engineer.

3.0 I have reviewed 35 USC 103(a), obviousness rejection regarding Claim 6, within the the December 30, 2008, Office Action regarding the above cited patent application. With respect to that rejection there are technical errors, regarding the citation of the Neidert et al. patent, U.S. 6,228,192, showing or implying that BuNena is substitutable for nitroglycerin in a gun propellant: specifically:

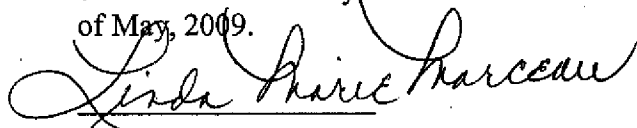
- (a) Neidert et al deals with rocket fuel, which is a low pressure environment, up to 10,000 psi; whereas, gun propellants require a minimum of approximately 30,000 psi up to about 125,000, i.e. 300% greater, at minimum, than rocket propellants – entirely different physical and chemical systems;
- (b) with respect to gun propellants -- BuNena is (1) a linear nitroamine; (2) very low energy material, (3) low flame temperature, (4) very insensitive; **in contrast**, nitroglycerin is a (i) a nitrate ester, (ii) which is non-linear in structure, (iii) very sensitive, (iv) very high energy and (v) hot flame temperature – in selecting a plasticizer, a gun scientist would not consider BuNena for any application that nitroglycerin would be considered for, nor would a scientist replace BuNena with nitroglycerin – they are opposite in application with respect to gun propellants;
- (c) further, experiments have shown that using greater than 10% BuNena overplasticizes a gun propellant with a nitrocellulose based binder/explosive system, this causes bubbles and further results in a brittle formulation, especially under cold temperatures under which gun propellants are required to perform. Brittle formulations can cause early detonation, or failure to sustain a shaped charge jet upon detonation.

4.0 For the reasons detailed above, there is no basis in the cited prior art, Hamilton et al., U.S. Pat. 5,602,361 and Neidert et al., U.S. Pat. 6,228,192, to combine 7% BuNena in a nitrocellulose based binder system, as in claim 6 of the subject application.

Signed:   
Thelma G. Manning

Dated: May 4, 2009

Sworn and Subscribed to  
before me this 4th day  
of May, 2009.



LINDA MARIE MARCEAU  
NOTARY PUBLIC OF NEW JERSEY  
My Commission Exp Sept. 5, 2012